

**TAXONOMIC REVIEW OF THE CANADIAN SPECIES OF THE GENUS *MONOTOMA*
HERBST (COLEOPTERA: MONOTOMIDAE)**

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Abstract

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The Canadian species of the genus *Monotoma* Herbst are reviewed. Twelve species are recognized, including three new species, *M. johnsoni* (type locality: Kerrville, Texas), *M. myrmecophila* (type locality: Aweme, Manitoba), and *M. emarginata* (type locality: Ottawa-Kanata, Ontario). The following new synonyms are proposed: *M. fulvipes* Melsheimer, 1844, *M. opaca* Ziegler, 1845, *M. fulvipennis* Motschulsky, 1868, *M. subnigra* Motschulsky, 1868, *M. obsolescens* Casey, 1916, and *M. famelica* Casey, 1916 with *M. picipes* Herbst, 1793; *M. quadraria* Casey, 1916 with *M. testacea* Motschulsky, 1845; *M. parallela* LeConte, 1855 with *M. bicolor* Villa and Villa, 1835; *M. avara* Blatchley, 1928 with *M. arida* Casey, 1916; *M. corpulenta* Motschulsky, 1868 and *M. rhodeana* Casey, 1916 with *M. americana* Aubé, 1837. Lectotypes are designated for *M. fulvipennis* Motschulsky, 1868, *M. subnigra* Motschulsky, 1868, *M. spinicollis* Aubé, 1837, *M. corpulenta* Motschulsky, 1868, *M. producta* LeConte, 1855, *M. famelica* Casey, 1916, *M. quadraria* Casey, 1916, *M. arida* Casey, 1916, and *M. rhodeana* Casey, 1916. The following information is provided for each species treated: citation of original description and synonymy, etymology (for new species only), type material studied, notes about synonymy (if required), recognition, description, distribution, and habitat. A key to the species is provided and important structural features are illustrated.

Résumé

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Cet ouvrage comprend une revue des espèces canadiennes du genre *Monotoma* Herbst. En tout 12 espèces sont traitées dont 3 sont nouvelles pour la science: *M. johnsoni* (localité-type: Kerrville, Texas), *M. myrmecophila* (localité-type: Aweme, Manitoba) et *M. emarginata* (localité-type: Ottawa-Kanata, Ontario). On propose la synonymie suivante: *M. fulvipes* Melsheimer, 1844, *M. opaca* Ziegler, 1845, *M. fulvipennis* Motschulsky, 1868, *M. subnigra* Motschulsky, 1868, *M. obsolescens* Casey, 1916 et *M. famelica* Casey, 1916 avec *M. picipes* Herbst, 1793; *M. quadraria* Casey, 1916 avec *M. testacea* Motschulsky, 1845; *M. parallela* LeConte, 1855 avec *M. bicolor* Villa and Villa, 1835; *M. avara* Blatchley, 1928 avec *M. arida* Casey, 1916; *M. corpulenta* Motschulsky, 1868 et *M. rhodeana* Casey, 1916 avec *M. americana* Aubé, 1837. On désigne des lectotypes pour *M. fulvipennis* Motschulsky, 1868, *M. subnigra* Motschulsky, 1868, *M. spinicollis* Aubé, 1837, *M. corpulenta* Motschulsky, 1868, *M. producta* LeConte, 1855, *M. famelica* Casey, 1916, *M. quadraria* Casey, 1916, *M. arida* Casey, 1916 et *M. rhodeana* Casey, 1916. Pour chaque espèce traitée, on donne les informations suivantes: citation de la description originale, **References**

synonymie, étymologie (pour les nouvelles espèces seulement), description du matériel-type étudié, notes sur la synonymie (si nécessaire), diagnose, description, répartition géographique et notes sur l'habitat. Un tableau de détermination des espèces est inclus et les caractères structuraux importants sont illustrés.

Introduction

Herbst proposed the genus *Monotoma* in 1793 for two new species, *M. striata* and *M. picipes*. The first species is now included in the genus *Synchita* Hellwig, 1792 (as a junior synonym of *S. humeralis* Fabricius, 1792) of the family Colydiidae and the second species, *M. picipes*, was designated as the type species of the genus *Monotoma* by Westwood (1838). Since then about 70 species of *Monotoma* have been described worldwide, of which some 40 names are still valid today. Several species have been introduced into various parts of the world through imported stored food products, so the genus could be considered as cosmopolitan.

The genus *Monotoma* has been included for a long time in the family Lathridiidae (Redtenbacher 1849, 1858, 1874; Thomson 1863; Seidlitz 1888 and others) or Cucujidae (Jacquelin du Val 1857; Ganglbauer 1899; Reitter 1911 and others), until it was placed in the family Rhizophagidae (Crowson 1955). Recently, Lawrence and Newton (1995) indicated that the family-group name Monotomidae, proposed by Laporte (1840), has priority over the family-group name Rhizophagidae, proposed by Redtenbacher (1845).

There is little literature dealing with the North American species of *Monotoma*. Horn (1879) published a synopsis of the species; Blatchley (1910) covered the species of Indiana; Casey (1916) described several new species; Hatch (1962) treated the species of the Pacific Northwest; and Downie and Arnett (1996) covered the species of northeastern North America.

Some species are associated with stored food products in Canada and their identification is often difficult using the existing literature. The purpose of this paper is to provide an identification tool for all the species found in Canada. With the exception of two species occurring in southern United States, *M. mucida* LeConte and *M. texana* Horn, this study covers all the described species from North America. Nevertheless, we have seen a number of apparently undescribed species from southern United States.

Materials and Methods

Male genitalia were extracted with fine forceps after the specimens were softened in hot water for 3–5 min. The genitalia were transferred to isopropyl alcohol for several hours, placed in xylene for a few seconds, and mounted in Canada balsam on transparent plastic plates. These structures were studied with an interference contrast microscope. These plastic plates were then subsequently pinned under the corresponding specimens.

The following measurements were taken from ten specimens of each species, using an eyepiece reticle on a stereomicroscope: length of pronotum along midline (L), and maximum width of pronotum excluding the posterior angles (W). Each species description ends with the size range (in millimetres), which is the range of the apparent total body length. This measurement was obtained by visually selecting three or four of the smallest and of the largest specimens and measuring them with a ruler along midline from the tip of the mandibles to the apex of the left elytron.

This study is based on the examination of approximately 3300 specimens borrowed from the following institutions. The name of the curators are listed after the institution addresses.

- AMNH Department of Entomology, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024, United States. Lee H. Herman.
- BMNH Department of Entomology, The Natural History Museum, Cromwell Road, London SW7 5BD, England. Martin J.D. Brendell.
- CCCH Claude Chantal Collection, 302 Gabrielle-Roy, Varennes, Québec J3X 1L8, Canada.
- CDAE California State Collection of Arthropods, Department of Food and Agriculture, 1220 N Street, Sacramento, California 95814, United States. Fred G. Andrews.
- CNCI Canadian National Collection of Insects, Eastern Cereal and Oilseed Research Centre, Agriculture and Agri-Food Canada, Ottawa, Ontario K1A 0C6, Canada.
- CPPA Pierre Paquin Collection, 11629 Des Violettes, Montréal-Nord, Québec H1G 4N1, Canada.
- CUIC Department of Entomology, Cornell University, Ithaca, New York 14850, United States. James K. Liebherr.
- FMNH Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, Illinois 60605, United States. Alfred F. Newton.
- FSCA Florida State Collection of Arthropods, Florida Department of Agriculture and Consumer Services, P.O. Box 147100, Gainesville, Florida 32614, United States. Michael C. Thomas.
- INHS Section of faunistic surveys and insect identification, Illinois Natural History Survey, 607 East Peabody Drive, Champaign, Illinois 61820, United States. Kathryn C. McGiffen.
- LSUC Louisiana State University Insect Collection, Department of Entomology, Louisiana State University, Baton Rouge, Louisiana 70803, United States. Vicky L. Moseley.
- MCZ Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts 02138, United States. David G. Furth.
- MHNP Muséum National d'Histoire Naturelle, 45 rue Buffon, F-75005 Paris, France. Nicole Berti.
- MMUM The Manchester Museum, The University, Manchester M13 9PL, England. Colin Johnson.
- NHDE Entomological Museum, Department of Zoology, University of New Hampshire, Durham, New Hampshire 03824, United States. Donald S. Chandler.
- ORUM Collection Ouellet-Robert, Département de biologie, Université de Montréal, Case Postale 6128, Montréal, Québec H3C 3J7, Canada. Louise Cloutier.
- OSUC Department of Entomology, Ohio State University, 1735 Neil Avenue, Columbus, Ohio 43210, United States. Charles A. Triplehorn.
- PURC Department of Entomology, Purdue University, Lafayette, Indiana 47907, United States. Arwin Provonsha.
- TAMU Department of Entomology, Texas A&M University, College Station, Texas 77843, United States. Edward G. Riley.
- UADE Department of Entomology, University of Arizona, Tucson, Arizona 85721, United States. David R. Maddison.
- UASM University of Alberta, Strickland Museum, Edmonton, Alberta, T6G 2E3, Canada. George E. Ball and Danny Shpeley.
- USNM Department of Entomology, United States National Museum of Natural History, Smithsonian Institution, Washington D.C. 20560, United States. James Pakaluk.
- ZMUM Zoological Museum, Moscow State University, Moscow 103009, Russia. Nikolai B. Nikitsky.

Terms for structures

The terms we use for external structures should be well known to coleopterists. However, the male genitalia of *Monotoma* have been little studied and will be discussed briefly. The tegmen is in a dorsal position and scoop-shaped; its apical margin is more or less rounded in most species, notched in others. The median lobe is rather short, broad, flat, slightly curved, and fits into the depression of the tegmen; it consists of two laminae that are fused basally, a ventral one, notched at middle in most species, and a dorsal one, truncate at the middle in most species (see Fig. 16).

Genus *Monotoma* Herbst, 1793

Monotoma Herbst 1793: 22. Type species: *Monotoma picipes* Herbst, 1793, subsequent designation by Westwood (1838: 13). Aubé (1837: 454); Redtenbacher (1849: 23, 202; 1858: lxxxiv, 377; 1874: xci, 413); Lacordaire (1854: 434); Jacquelin du Val (1857: 197); Wollaston (1857: 67; 1871: 239); LeConte (1861: 86); Thomson (1863: 211); Motschulsky (1868: 196); Reitter (1876: 297; 1884: 272; 1901a: 193; 1901b: 3; 1911: 42); Horn (1879: 258); LeConte and Horn (1883: 155); Seidlitz (1872: 41 [Gattungen]; 1888: 60 [Gattungen]; 1889: 60 [Gattungen]); Fowler (1889: 270); Acloque (1896: 218); Everts (1899: 562); Ganglbauer (1899: 571); Stierlin (1900: 565); Grouvelle (1908b: 493); Blatchley (1910: 667); Kuhnt (1912: 503); Jacobson (1915: 898); Casey (1916: 88); Hansen (1950: 146); Arnett (1962: 768); Hatch (1962: 251); Kuschel (1979: 45); Ślipiński (1981: 6); Nikitsky (1986: 1625); Sengupta (1988: 22); Downie and Arnett (1996: 985–986).

Diagnosis. Adults of *Monotoma* are easily recognized among North American members of the family Monotomidae by the coarse, subcontiguous punctures on the head dorsally and on the pronotum (except in *M. longicollis* Gyllenhal), by the rows of paired punctures on the elytra, as well as by the protruding anterior angles of the pronotum (less so in *M. quadrifoveolata* Aubé).

Description. (see Lawrence (1982) and Sengupta (1988) for family character states). **Shape.** Elongate, not depressed, covered with moderately dense setae, 1.4–3.2 mm. **Head.** Neck with short but distinct constriction; temples less than twice length of longitudinal diameter of eyes. Eyes well developed. Antennomere 1 globular; antennomere 2 smaller than antennomere 1; antennomere 3 slightly elongate; antennomeres 4–8 short, subequal; antennomere 9 slightly larger than antennomere 8; antennomeres 10–11 more or less fused, much larger than antennomere 9, forming antennal club. Antennal cavities absent. Gular region anteriorly with transverse, semi-circular carina joining maxillary foveae. Labial and maxillary palpomeres 2 larger than remaining palpomeres. **Prothorax.** Pronotum subquadrate to elongate (less than 1.3 times as long as wide), in most species with large, more or less subcontiguous punctures; lateral sides with indentations, each carrying one seta; anterior angles prominent in most species; base with pair of shallow foveae. Fore coxal cavities rounded; hind coxal cavities widely separated. **Legs.** Fore trochantins hidden. Tarsal formula 5-5-4 in males, 5-5-5 in females. **Elytra.** Setigerous punctures paired, with seta between them, aligned in longitudinal rows (though more or less confused anteriorly and posteriorly). **Abdomen.** First visible sternite longer than remaining sternites, without coxal lines; visible sternites 2–4 subequal, short. **Male genitalia.** Median lobe short, broad, flattened; tegmen larger than median lobe.

Sexual Dimorphism. Sexes are easily separated by the number of visible abdominal tergites beyond the apex of the elytra. Males have two visible tergites, females one. Some species show sexually dimorphic characters on the front tibia. In the males, the medial side of the front tibia is slightly curved apically and possesses minute spinulae. In females of two species, the posterior

dorsal margin of the head bears a small, median projection. In addition to the above characters, the tarsal formula is different, 5-5-4 in males, 5-5-5 in females.

Monophyly and phylogenetic relationships. The enlarged labial and maxillary palpomeres 2, the paired setigerous punctures on the elytra, and the protruding anterior angles of the pronotum (less so in *M. quadrifoveolata*) are likely autapomorphic states for members of *Monotoma* (see Sengupta's (1988) review of the family) and suggest that the genus is monophyletic.

The general habitus of adults of *Monotoma* is readily different from the habitus of other members of Monotomidae and Sengupta (1988) proposed the tribe Monotomini for *Monotoma*. Until the phylogenetic relationships of the genera of Monotomidae are investigated, the systematic position of the genus *Monotoma* will remain unsettled.

Biology. Little is known about the bionomics of members of *Monotoma*. It is generally accepted that the adults are mould feeders. They mainly occur in decaying vegetable matter, and are often found in man-made habitats such as compost heaps and haystacks (Peacock 1977: 2). Some species also occur in stored food products (Bousquet 1990). The three species of the subgenus *Gyrocecis* Thomson live in nests of the ant genus *Formica* Linné. Gut contents of larvae of *M. producta* LeConte collected in New Hampshire revealed that they feed on the spores of two species of Fungi Imperfecti (Chandler 1983).

Larvae. To date only the larva of *Monotoma producta* has been described and figured (Chandler 1983). Peacock (1977) presented a brief description of the genus based on larvae of *M. brevicollis* Aubé and *M. picipes*.

Distribution. Endemic species of *Monotoma* are known from Europe, Asia, North Africa, Madagascar, North America, and Central America. Some species have been introduced in various parts of the world and the genus could be considered as subcosmopolitan.

Note on subgenera. Besides the nominotypical subgenus, the genus *Monotoma* includes two subgenera: *Monotomina* Nikitsky, 1986 for *M. quadrifoveolata* Aubé, and *Gyrocecis* Thomson, 1863 with *M. angusticollis* Gyllenhal, *M. conicicollis* Guérin-Ménéville, and *M. myrmecophila* Bousquet and Laplante. These subgenera were proposed because their members differ readily in their external structures from those of other species of the genus. However, we have seen other species that are structurally as distinct as these species. Until a cladistic analysis of the species of *Monotoma* is completed, we prefer not to use the current subgeneric arrangement.

Note on nomenclature. The name *Monotoma* was originally proposed in 1793 by both Herbst and Panzer. The first author included *M. striata* Herbst, 1793 and *M. picipes* Herbst, 1793 in the genus and the second author included *M. crenata* (Fabricius, 1775). As we have found no information relevant to a precise publication date of the works of Herbst and Panzer, we must assume that the two names were published simultaneously, the last day of the year (ICZN, 1985, Art. 21(c)). To promote stability, *Monotoma* Herbst, 1793 is here regarded as a valid name, with *Monotoma picipes* Herbst, 1793 as the type species, and *Monotoma* Panzer, 1793 (type species: *Tritoma crenata* Fabricius, 1775 by monotypy) as an objective synonym of *Bitoma* Herbst, 1793 (type species: *Tritoma crenata* Fabricius, 1775, subsequent designation by Latreille 1810: 431). Both *Bitoma* Herbst, 1793 and *Monotoma* Panzer, 1793 were published simultaneously and *Bitoma* Herbst is here regarded as the valid name. In summary, *Monotoma* Panzer, 1793 is regarded as a junior homonym of *Monotoma* Herbst, 1793 and a junior objective synonym of *Bitoma* Herbst, 1793.

Checklist of Species Treated

1. *Monotoma longicollis* (Gyllenhal, 1827)
2. *Monotoma picipes* Herbst, 1793
3. *Monotoma spinicollis* Aubé, 1837
4. *Monotoma johnsoni* Bousquet and Laplante, **n.sp.**
5. *Monotoma quadrifoveolata* Aubé, 1837
6. *Monotoma producta* LeConte, 1855
7. *Monotoma myrmecophila* Bousquet and Laplante, **n.sp.**
8. *Monotoma testacea* Motschulsky, 1845
9. *Monotoma bicolor* Villa and Villa, 1835
10. *Monotoma arida* Casey, 1916
11. *Monotoma americana* Aubé, 1837
12. *Monotoma emarginata* Bousquet and Laplante, **n.sp.**

Key to the species of *Monotoma* in Canada and adjacent parts of USA

- 1 Pronotum distinctly wider anteriorly (Fig. 2). Pronotum with small shallow punctures, irregularly spaced, not contiguous *M. longicollis* (Gyllenhal)
- Pronotum more or less parallel-sided or wider posteriorly (Figs. 3–11). Pronotum with large, deep, contiguous or subcontiguous punctures 2
- 2 Frons with 2 deep, longitudinal impressions (Fig. 3) *M. picipes* Herbst
- Frons without longitudinal impressions 3
- 3 Anterior angles of pronotum each produced in form of a large acute tooth (Fig. 4) 4
- Anterior angles of pronotum at most with rounded or blunt nodiform projections 5
- 4 Pronotum with anterior angles usually projected latero-anteriorly (Fig. 4). Aedeagus as in Fig. 14 *M. spinicollis* Aubé
- Pronotum with anterior angles usually projected laterally (Fig. 24). Aedeagus as in Fig. 23 *M. johnsoni* **n.sp.**
- 5 Pronotal disc with 4 deep foveae, joined in pairs on each side to form 2 longitudinal furrows (Fig. 5) *M. quadrifoveolata* Aubé
- Pronotal disc with 2, usually shallow, foveae in posterior half, rarely with 2 very shallow impressions in anterior half (not connected to basal foveae) 6
- 6 Pronotum elongate (ratio L/W usually > 1.18), with extremity of anterior angles blunt (Fig. 6) *M. producta* LeConte
- Pronotum usually less elongate (ratio L/W < 1.15), with extremity of anterior angles rounded (Figs. 7–11) 7
- 7 Temples relatively long, 0.5–0.8 times length of longitudinal diameter of eye (Figs. 7–9) .. 8
- Temples relatively short, about 0.3 times length of longitudinal diameter of eye (Figs. 10–11) 10

- 8 Setae on head and pronotum short, wide, more or less recumbent. Pronotum with sides divergent posteriorly (Fig. 7). Antennomere 3 slightly shorter than antennomere 2 *M. myrmecophila* **n.sp.**
- Setae on head and pronotum elongate, narrow, suberect. Pronotum with sides more or less parallel to slightly rounded posteriorly (Figs. 8–9). Antennomere 3 as long as antennomere 2 9
- 9 Body dorsally more or less uniformly reddish. Pronotum with sides slightly sinuate to parallel, anterior angles slightly protruding (Fig. 8); disc rather flat, with 2 more or less distinct impressions on anterior half *M. testacea* Motschulsky
- Head and pronotum reddish brown to piceous, distinctly darker than elytra. Pronotum with sides usually rounded, anterior angles more protruding (Fig. 9); disc rather convex, without impressions on anterior half *M. bicolor* Villa and Villa
- 10 Abdomen with 2 exposed tergites..... ($\sigma\sigma$) 11
- Abdomen with 1 exposed tergite (♀♀) 13
- 11 Last visible abdominal sternite with large, median, oval, finely granulate depression. Pronotum slightly elongate (1.10–1.15 times as long as wide) *M. arida* Casey
- Last visible abdominal sternite at most with small, shallow, relatively smooth depression. Pronotum subquadrate (1.00–1.07 times as long as wide) 12
- 12 Tegmen shallowly notched at apex (Fig. 21) *M. americana* Aubé
- Tegmen markedly notched at apex (Fig. 22) *M. emarginata* **n.sp.**
- 13 Pronotum slightly elongate (1.10–1.15 times as long as wide) *M. arida* Casey
- Pronotum subquadrate (1.00–1.07 times as long as wide) 14
- 14 Posterior margin of head with small, hornlike, median projection (Fig. 11). Last visible abdominal sternite smooth *M. americana* Aubé
- Posterior margin of head without median projection. Last visible abdominal sternite with small protuberance in most specimens *M. emarginata* **n.sp.**

***Monotoma longicollis* (Gyllenhal, 1827)**

(Figs. 2, 12)

Cerylon longicolle Gyllenhal 1827: 635. Type locality: «Sparrsätra Westrogothiae» and «Smolandia». *Monotoma longicollis*: Aubé (1837: 467); Redtenbacher (1858: 377; 1874: 414); Thomson (1863: 212); Seidlitz (1872: 165; 1888: 241; 1889: 256); Reitter (1877: 6; 1901a: 197; 1901b: 7; 1911: 43); Horn (1879: 261); Fowler (1889: 271, 274); Acloque (1896: 219); Everts (1899: 564; 1922: 253); Ganglbauer (1899: 577); Stierlin (1900: 567); Grouvelle (1908a: 21); Blatchley (1910: 669); Kuhnt (1912: 506); Hansen (1950: 147, 151); Hatch (1962: 252); Vogt (1967: 85); Peacock (1977: 12); Kuschel (1979: 45); Ślipiński (1981: 8); Nikitsky (1986: 1627); Milander (1992: 70); Otero and Días-Pazos (1994: 103); Downie and Arnett (1996: 987).

Diagnosis. This species is easily separated from the other taxa treated by the shape of the pronotum, which is wider anteriorly and narrowed posteriorly, and by the shallow, rather small punctures on the head and pronotum.

Description. Colouration. Body dorsally more or less uniformly reddish brown to piceous. **Pubescence.** Setae on dorsum of body elongate, narrow, most of those on pronotum and elytra recumbent. **Punctuation.** Frons and pronotum with rather small, shallow, more or less dense punctures, often placed in groups of 2 or 3, particularly on disk of pronotum. Metasternum posteromedially and first visible sternite medially with very fine, almost imperceptible punctuation. **Head** (Fig. 2). Frons without deep longitudinal impressions; median area not raised. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, more or less rounded, not angulate. Eyes proportionally large; temples short, length 0.3–0.4 times that of longitudinal diameter of eyes, more or less divergent and somewhat acutely produced posteriorly. **Thorax.** Pronotum (Fig. 2) elongate, 1.2–1.3 times as long as wide, widest at level of anterior angles; sides tapered toward base; lateral indentations fine; anterior angle slightly protruding, its extremity rounded or blunt; posterior angle indistinct; disc without impressions on anterior half in most specimens (a few specimens seen with 2 very shallow impressions); surface between punctures dull, with isodiametric microsculpture. **Elytra.** Rows of setigerous punctures more confused than in other species treated, especially in apical half. **Abdomen.** Male first visible abdominal sternite without median depression; last visible abdominal sternite simple. **Male genitalia** (7 specimens dissected) (Fig. 12). Ventral lamina emarginate medially; dorsal lamina narrowly rounded medially; tegmen with extremity more or less rounded.

Length of body: 1.4–1.9 mm.

Distribution. This species has been reported from Europe, Caucasus, Japan, west Africa, Australia, New Zealand, and America (Hetschko 1930; Nikitsky 1986). The species has been accidentally introduced in North America. In the United States it is known from Alabama, Arizona, Connecticut, District of Columbia, Florida, Illinois, Indiana, Maine, Massachusetts, Minnesota, Missouri, Nevada, New Hampshire, North Carolina, Oklahoma, Vermont, Wisconsin. We have seen Canadian specimens from the following localities: **Newfoundland.** Portugal Cove, 19.VII.1981 (CNCI) 3. **New Brunswick.** Kouchibouguac Nat. Pk., 21.IX.1977, Campbell & Smetana (CNCI) 3; idem, 12.IX.1977, G.A. Calderwood (CNCI) 1. **Québec.** Montréal 18.IV., 25.IV., J. Ouellet (ORUM) 2; idem, 2.IX.1973, E.J. Kiteley (CNCI) 1. Frelighsburg, 21.V.1985, N.J. Bostanian (CNCI) 1. Montebello 29.VII.37, J. Ouellet (ORUM) 1. La Trappe 28.V.44, 14.VI.44, 29.VI.44, J. Ouellet (ORUM) 3. 112 km N La Sarre, 7–14.IX.1997, P. Paquin (CPPA) 1. 122 km N La Sarre, 7–14.IX.1997, P. Paquin (CPPA) 1. Lac Duparquet, 17–24.VII.1994, 25.VIII.–1.IX.1996, 1–8.IX.1996, P. Paquin (CPPA) 3. Lac Labyrinthe, 1–8.IX.1996, P. Paquin (CPPA) 1. **Ontario.** Ottawa-Kanata, 25.V.1979, 9.VII.1979, A. & Z. Smetana (CNCI) 5. **Saskatchewan.** Bounty, 2.XI.53 (CNCI) 3. Thrasher, 1.XII.1953, D.B. Waddell (CNCI) 6. Zealandia, 25.V.1953, H. McDonald (CNCI) 1. Sovereign, 27.VII.1954, D.B. Waddell (CNCI) 1. **Alberta.** Calgary, 27.VIII.1981, B.F. & J.L. Carr (CNCI) 1.

Habitat. Some of the specimens studied were collected in grass piles and in stored wheat.

Monotoma picipes Herbst, 1793

(Figs. 1, 3, 13)

Monotoma picipes Herbst 1793: 24. Type locality not mentioned. Aubé (1837: 458); Redtenbacher (1849: 203; 1858: 378; 1874: 415); Thomson (1863: 211); Reitter (1877: 6; 1884: 272; 1901a: 194; 1901b: 4; 1911: 43); Seidlitz (1872: 165; 1888: 240; 1889: 255); Horn (1879: 259); Fowler (1889: 271, 273); Acloque (1896: 219); Everts (1899: 563; 1922: 253); Ganglbauer (1899: 576); Stierlin (1900: 567); Blatchley (1910: 668); Kuhnt (1912: 506); Hansen (1950: 147, 151); Hatch (1962: 251); Vogt (1967: 85); Kuschel (1979: 46); Ślipiński (1981: 9); Nikitsky (1986: 1628); Milander (1992: 71); Otero and Días-Pazos (1994: 101); Downie and Arnett (1996: 987).

Lyctus picipes: Paykull (1800: 331).

Cerylon picipes: Gyllenhal (1813: 417).

Monotoma fulvipes Melsheimer 1844: 111. Type locality: "Pennsylvania" [new synonymy].

Monotoma opaca Ziegler 1845: 271. Type locality: "Pennsylvania" [new synonymy].

Monotoma foveatum LeConte 1855: 305. Type locality: "Ohio". Synonymy established by Horn (1879: 259).

Monotoma fulvipennis Motschulsky 1868: 199. Type locality: "Amérique boréale" [new synonymy].

Monotoma subnigra Motschulsky 1868: 199. Type locality: "Amérique du Nord" [new synonymy].

Monotoma obsolescens Casey 1916: 88. Type locality: "District of Columbia" [new synonymy].
Downie and Arnett (1996: 987).

Monotoma famelica Casey 1916: 89. Type locality: "Lake Co., California" [new synonymy].

Type Material Studied. There is no specimen of *M. fulvipes* in Melsheimer's collection in the MCZ but the LeConte's collection includes six specimens under that name. The first one is labelled "(Pink disc)/ *M. fulvipes* Mels. opaca Ziegler [handwritten]" and the five others "Garland Col. 25.6". The first specimen agrees well with the original description and could be a specimen from Melsheimer's collection. The specimen belongs to *M. picipes*, whereas the other five specimens belong to *M. myrmecophila*.

The Motschulsky collection contains two specimens under the name of *M. fulvipennis*. Both specimens, glued on one plate, are males. They are labelled: "(small, round, green label)/ *Monotoma fulvipennis* Motsch Am. bor. [handwritten]/ Lectotypus *Monotoma fulvipennis* Motsch [partly handwritten]". The specimen located on the posterior end of the plate is here designated as the lectotype.

The Motschulsky collection contains two specimens under the name of *M. subnigra*. Both specimens, glued on one plate, are females. They are labelled: "(small, round, green label)/ *Monotoma subnigrum* Motsch Am. bor. [handwritten]/ Lectotypus *Monotoma subnigra* Motsch [partly handwritten]". The specimen on the anterior end of the plate is here selected as the lectotype.

Casey's collection in the USNM contains a single specimen under the name of *M. obsolescens* labelled "D.C./ Casey bequest 1925/ Type USNM 49188/ obsolescens Csy [handwritten]". The specimen, a female, is the holotype, since Casey (1916) specified having seen a single example.

Casey's collection in the USNM includes two specimens under the name of *M. famelica*. One, a male, is labelled "Lake Co. cal/ Casey bequest 1925/ Type USNM 49185/ famelica Csy [handwritten]" and the other, a female, "Or/ Casey bequest 1925/ famelica 2 Paratype USNM 49185". The male specimen is here designated as lectotype and the label "Lectotype *Monotoma famelica* Csy des. Y.Bousquet '88" has been attached to it.

Notes about Synonymy. The type specimens of *M. fulvipennis*, *M. subnigra*, *M. obsolescens*, and *M. famelica* agree in external structures with the specimens of *M. picipes* we have seen from Europe and North America.

No type specimen of *M. fulvipes* has been found although one specimen in the LeConte's collection could be an authentic Melsheimer's specimen (see "Type Material Studied" section). Melsheimer (1844) mentions in the original description "head ... with two longitudinal impressions between and near the eyes". This character state applies only to *M. picipes*. We believe the name *M. fulvipes* is best placed in synonymy with *M. picipes*.

In the original description of *M. opaca*, Ziegler (1845) indicates that the "head [is] with a somewhat dilated, longitudinal impression each side between the eyes". Such character state applies only to *M. picipes*. LeConte (1855: 305) had already synonymized *M. opaca* with *M. fulvipes*.

Monotoma parallelocollis Motschulsky, 1868 has been listed as a junior synonym of *M. fulvipes* Melsheimer following Reitter's comments (1877). We have been unable to borrow the type material

of Motschulsky's species from the Zoological Museum, Moscow State University, where it is presumably deposited. The original description is very short and does not include any pertinent character states. We believe it is best to consider *M. parallelocollis* as a valid species, until the type material becomes available for study.

Diagnosis. This species is easily recognized among the species treated by the presence of a pair of deep longitudinal impressions on the frons.

Description. Colouration. Head and pronotum piceous to black, elytra brown to dark reddish brown, occasionally blackish or yellowish, humeral calli slightly paler. **Pubescence.** Setae on dorsum of body elongate, narrow, most of those on pronotum and elytra suberect. **Punctuation.** Frons and pronotum with deep, large punctures separated by less than half their diameter, more or less subcontiguous particularly on side of pronotum. Metasternum posteromedially and first visible abdominal sternite medially (at least on anterior half) with rather coarse punctures. **Head** (Fig. 3). Frons with 2 deep longitudinal impressions; median area, between impressions, slightly raised. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes proportionally large; temples short, length 0.3–0.4 times that of longitudinal diameter of eyes, slightly divergent posteriorly. **Thorax.** Pronotum (Fig. 3) slightly elongate, 1.1–1.2 times as long as wide, widest usually just before level of posterior angles; sides slightly rounded; lateral indentations rather coarse; anterior angle protruding, its extremity rounded; posterior angle distinct, marked by protuberance; disc without impressions on anterior half in most specimens (a few specimens seen with 2 shallow impressions). **Abdomen.** Male first visible abdominal sternite with slight, oval, median depression; last visible abdominal sternite simple. **Male genitalia** (6 specimens dissected) (Fig. 13). Ventral lamina more or less truncate medially; dorsal lamina rounded; tegmen with extremity more or less rounded.

Length of body: 1.9–2.5 mm.

Distribution. This species has been recorded from many countries around the world and is regarded as cosmopolitan by Nikitsky (1986). In North America, it occurs from the Atlantic to the Pacific coasts. We have seen specimens in the United States from Arizona, California, Colorado, Connecticut, District of Columbia, Florida, Illinois, Indiana, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Mexico, New York, Oklahoma, Pennsylvania, Tennessee, Texas, Vermont, Virginia, Washington, and Wisconsin. We have seen specimens from the following Canadian localities: **Newfoundland:** Portugal Cove, 19.VII., 1.IX.1981 (CNCI) 3. **Nova Scotia.** Halifax (MMUM) 1. **New Brunswick:** Moncton (MMUM) 7. Kouchibouguac Nat. Pk., 21.IX.1977, Campbell & Smetana (CNCI) 10. French Lake, 2.VI.28, W.J. Brown (CNCI) 1. Pointe-du-Chêne (MMUM) 1. **Québec.** Outremont, 21.VII.17, J. Ouellet (CNCI) 4. Montréal, 21.IV.19, 10.V.19, 19.V.19, 26.V.19, 8.VI.19, 8.VI.21, 20.VI.22, 3.X.28, J. Ouellet (ORUM) 11; idem, 17.VII.1974, 21.VII.1974, 6.VII.1976, 28.VI.1977, 16.VII.1981, E.J. Kiteley (CNCI) 5. Montebello (CUIC) 3; idem, 25.VI.37, 26.VI.37, 8.VII.37, 10.VII.37, 13.VII.37, 22.VII.37, 29.VII.37, 31.VII.37, J. Ouellet (ORUM) 14. Berthierville, 15.VI.38, J. Ouellet (ORUM) 1. La Trappe, 2.VII.43, 1.VI.44, 2.VI.44, 2.VII.44, 31.VII.44, 1.VIII.44, 3.VIII.44, 17.VII.45, J. Ouellet (ORUM) 9. Saint-Rémi, 28.IX., J. Ouellet (ORUM) 2. Mistassini, 9.VII.44, 30.VII.44, A. Robert (ORUM) 2. Louiseville, 1.VIII.1975, L. LeSage (ORUM) 1. Longueuil, 2.VI.34, J. Ouellet (ORUM) 1. Rigaud, 26.VI.39, A. Robert (ORUM) 1. Parc de la Gatineau, 15–22.IV.1987, J. Denis & J. Huber (CNCI) 1. **Ontario.** Ottawa-Kanata, 25.V.1979, A. & Z. Smetana (CNCI) 2. Prince Edward Co., VII.17, J.F. Brimley (CNCI) 1. Rondeau Prov. Pk., Lakeshore Road, 6.VI.1985, A. Davies & J.M. Campbell (CNCI) 1. Wheatley, 24.VI.65 (FSCA) 1. Tilbury, V.67, K. Stephan (FSCA) 1. **Manitoba.** Winnipeg, 24.VI.11, J.B. Wallis (CNCI) 1. Brandon, 27.V.1951, C.F. Barrett (CNCI) 1. **Alberta.** Calgary, 20.VIII.1981, 28.VIII.1981, B.F. & J.L. Carr (CNCI) 2. **British Columbia.** Vancouver Is. (MCZ) 1. Vancouver, Stanley Pk., IX.67, W. Lasorko (FSCA) 1. Victoria

(MCZ) 1. Lahache Lk. (MCZ) 1. Kaslo, 18.VII. (USNM) 1. Fort St. James, 1.VIII.95, S. Guthrie (CNC) 1.

Habitat. In decaying vegetable matter; also found under the bark of pine logs, in moss, seaweed and occasionally with ants (Peacock 1977).

Monotoma spinicollis Aubé, 1837

(Figs. 4, 14)

Monotoma spinicollis Aubé 1837: 463. Type locality: «environs de Compiègne [France]». Redtenbacher (1858: 378; 1874: 414); Wollaston (1867: 60; 1877: 41); Seidlitz (1872: 165; 1888: 240; 1889: 255); Reitter (1877: 5; 1901a: 194; 1901b: 4; 1911: 43); Fowler (1889: 255); Acloque (1896: 219); Everts (1899: 563; 1922: 252); Ganglbauer (1899: 576); Stierlin (1900: 566); Grouvelle (1908a: 21); Kuhnt (1912: 506); Hansen (1950: 147, 150); Hatch (1962: 251); Vogt (1967: 86); Kuschel (1979: 46); Ślipiński (1981: 9); Milander (1992: 70); Otero and Días-Pazos (1994: 103). *Monotoma spinifera* Wollaston 1857: 67. Type locality: «Ribiero de São Jorge», Madeira. Synonymy established by Wollaston (1864: 123)¹.

Type Material Studied. Aubé's collection in MHNP contains 7 specimens under the name *M. spinicollis*. Two of them, labelled "Corse" on the back of a mounting plate on which both are glued, are not syntypes. Of the remaining five specimens, the single male labelled "14 7^{bre} [= septembre ?] 1836 [handwritten on the back of the plate]/ Muséum Paris 1869 Coll. Ch. Aubé/ TYPE/ LECTOTYPE (♂) *M. spinicollis* Aubé Des. Bousquet & Laplante 1998" is designated as the lectotype. The male genitalia of the specimen were pulled out and mounted on a transparent plastic plate, in Canada balsam. The specimen is glued on a plate along with a female specimen.

We have seen one specimen of *M. spinifera* from the BMNH. The specimen, a male, is here designated as the lectotype. It is labelled: "Type/ spinifera, Woll. [handwritten]/ Lectotype *M. spinifera* Wollaston Des. Bousquet & Laplante 1998". The male genitalia of the specimen were pulled out and mounted on a transparent plastic plate, in Canada balsam.

Diagnosis. This species is recognized by features of the pronotum: the sides are distinctly and evenly rounded, the anterior angles are prominent, acute, usually oriented latero-anteriorly, and the posterior angles are indistinct.

Description. Colouration. Head and pronotum reddish brown to piceous, elytra usually paler, reddish yellow to reddish brown. **Pubescence.** Setae on dorsum of body elongate, wider than in *M. picipes*. **Punctation.** Frons and pronotum with large, deep, subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially (on anterior half) with coarse punctures. **Head** (Fig. 4). Frons without longitudinal impressions; median area slightly raised and somewhat depressed before posterior margin. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, clearly angulate. Eyes proportionally large; temples moderately long, length 0.5–0.6 times that of longitudinal diameter of eyes, very slightly divergent posteriorly. **Thorax.** Pronotum (Fig. 4) convex, slightly elongate, 1.1–1.2 times as long as wide, widest just behind middle; sides markedly rounded; lateral indentations coarse; anterior angle protruding, usually oriented latero-anteriorly, its extremity acute; posterior angle indistinct; disc without impressions on anterior half. **Abdomen.** Male first visible sternite

¹ Hetschko (1930: 99) listed "*spinigera* Chaud. Bull. Moscou XVIII, 1845, III, p. 211" as a junior synonym of *spinicollis* Aubé. We have found no reference to a *M. spinigera* in Chaudoir's paper of 1845. We believe the name does not exist.

without median depression; last visible sternite simple. **Male genitalia** (5 specimens dissected) (Fig. 14). Ventral lamina very narrowly emarginate medially; dorsal lamina rounded medially; tegmen shorter than median lobe, with extremity broadly emarginate.

Length of body: 2.0–2.6 mm.

Distribution. The species has been recorded from several countries in Europe and from New Zealand, eastern Africa, Cape of Good Hope (see Otero and Díaz-Pazos 1994), Asia Minor, Syria, Guadeloupe, Saint Vincent, and Grenada (see Blackwelder 1945). However, some of these records could be incorrect since there are two species confused under the name *M. spinicollis*. We have seen specimens of *M. spinicollis* from England, France, Dalmatia, Greece, Morocco, and from the United States (Massachusetts). We have seen a single specimen from Canada: **Ontario**. Ottawa, Mer Bleue, 16.IX.1980, R. Baranowski (CNCI) 1♂.

Habitat. In decaying vegetable matter (Peacock 1977).

Comments. In the course of this study, we found out that two species were included in the concept of *M. spinicollis*. The other species is described below under the name *M. johnsoni*.

Monotoma johnsoni Bousquet and Laplante, n.sp.

Etymology. Patronymic; named in honour of Colin Johnson who kindly provided specimens of this and other species for our study.

Type Material. Holotype (♂) labelled: “Kerrville, TEX. April 4 1959 Becker & Howden/ Holotype *Monotoma johnsoni* Bousquet & Laplante CNC No. 22422”. The specimen is deposited in the Canadian National Collection of Insects.

Paratypes from the following localities. **United States of America.** *California.* Pasadena, April, Dr. A. Fenyés (CUIC, MCZ) 2♂, 2♀. Anaheim, 7.VI.74 (FSCA) 1♂. *Oregon.* Philomath, 14.IV.1960, Harold Foster (USNM) 1♂. *Oklahoma.* Latimer Co., 1 mi E Panola, 3.VII.1987, D. Chandler & K. Stephan (NHDE) 3♂, 1♀. *Hawaii.* Barbers Point, Oahu, 3.60 E.J. Ford Jr. (USNM) 1♂. **Brazil.** Nova Teutonia, Santa Catarina, F. Plaumann (MCZ) 1♂. **Portugal.** Algarve, Alvor, Portimão, 2-14.VIII.1992, C. Johnson (MMUM) 1♂. **Ethiopia.** Addis Abeba., XII.73, G. de Rougemont (MMUM) 1♂. **Australia.** New South Wales, Cumberland, B.G. Rye (MMUM) 1♂.

Diagnosis. This species is very similar to *M. spinicollis* but differs by the character states listed below.

Description. Same character states as *M. spinicollis* except for the followings. **Head** (Fig. 24). Eyes slightly more protruding. **Thorax.** Pronotum (Fig. 24) with lateral sides usually less evenly rounded; anterior angle usually oriented more laterally; basal impressions slightly deeper. **Abdomen.** Male first visible abdominal sternite slightly convex, its punctuation usually slightly coarser. **Male genitalia** (9 specimens dissected). Aedeagus as in Fig. 23.

Distribution. The species is probably widely distributed in the world. We have seen specimens from the New World, Europe, Africa, and Australia. The species has not yet been found in Canada but is included in this work because of the possibility that it occurs there.

Habitat. The specimen from Ethiopia come from “compost heap”. The specimen from Portugal was sieved from decaying vegetational rubbish (C. Johnson, pers. comm.).

Monotoma quadrifoveolata Aubé, 1837

Monotoma quadrifoveolata Aubé 1837: 468. Type locality: «environs de Compiègne [France]». Redtenbacher (1849: 203; 1858: 377; 1874: 414); Seidlitz (1872: 164; 1888: 240; 1889: 255); Reitter (1877: 4; 1884: 272; 1901a: 193; 1901b: 3; 1911: 42); Horn (1879: 260); Fauvel (1895: 108); Acloque (1896: 219); Everts (1899: 563; 1922: 251); Ganglbauer (1899: 574); Stierlin (1900:

566); Blatchley (1910: 668); Kuhnt (1912: 506); Hansen (1950: 146, 149); Vogt (1967: 84); Ślipiński (1981: 6); Nikitsky (1986: 1627).

Monotomina quadrifoveolata: Otero (1991: 255).

Recognition. This species is easily recognized by the two longitudinally confluent oval impressions on each side of the pronotum.

Description. Colouration. Body dorsally uniformly yellowish to reddish, sometimes reddish brown. **Pubescence.** Setae elongate, wider than in *M. picipes*. **Punctuation.** Frons and pronotum scabrous, with rather small, deep punctures (which are mostly hidden by the setae). Metasternum posteromedially and first visible abdominal sternite medially (on anterior half) with coarse punctures. **Head** (Fig. 5). Frons without longitudinal impressions; median area slightly raised but sharply declivous posteriorly. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes proportionally small; temples long, length 1.2–1.5 times that of longitudinal diameter of eyes, more or less parallel. **Thorax.** Pronotum (Fig. 5) subquadrate to slightly elongate, 1.0–1.1 times as long as wide; sides parallel; lateral indentations small, sometimes more or less distinct; anterior angle not protruding, its extremity rounded; posterior angle distinct; disc with 4 deep impressions confluent into 2 longitudinal furrows. **Abdomen.** Male first visible sternite with slight, oval, median depression; last visible sternite simple. **Male genitalia** (3 specimens dissected) (Fig. 15). Ventral lamina notched medially; dorsal lamina narrowly truncate medially; tegmen with extremity rounded and crenulate.

Length of body: 1.9–2.3 mm.

Distribution. This species has been reported from many countries around the world and is regarded as cosmopolitan (Nikitsky 1986). In North America, we have seen specimens from Illinois, Minnesota, New Mexico, New York, Pennsylvania, Washington DC, and from the following Canadian locality: **Ontario.** Tilbury, Kent Co., V.1967, K. Stephan (CNCI) 4♂, 3♀.

Habitat. In decaying vegetable matter (Peacock 1977).

Comments. This species has been included within the subgenus *Gyrocecis* by several authors. We have found no character states that would suggest that *M. quadrifoveolata* is indeed closely related to the other species of *Gyrocecis*. Nikitsky (1986) created the subgenus *Monotomina* for *M. quadrifoveolata*.

Monotoma producta LeConte, 1855

Monotoma productum LeConte 1855: 305. Type locality: “New York”.

Monotoma producta: Horn (1879: 259); Blatchley (1910: 668); Downie and Arnett (1996: 987).

Type Material Studied. LeConte’s collection in the MCZ includes four specimens under the name *M. producta*. They are labelled as follows: specimen 1 “(Pink disc)/ Type 7040/ *Monotoma productum* Lec.”; specimens 2 and 3 “(Pink disc)”; specimen 4 “O”. The first specimen, a male, is here designated as the lectotype and the label “Lectotype *Monotoma producta* LeC. des. Y. Bousquet ’87” has been attached to it.

Diagnosis. This species is easily recognized by features of the pronotum which is usually distinctly elongate, with the sides divergent posteriorly, the anterior angles blunt, and the posterior angles marked by large protuberances.

Description. Colouration. Body dorsally uniformly reddish brown to piceous. **Pubescence.** Setae on dorsum rather short, narrow, more or less recumbent. **Punctuation.** Frons and pronotum with large, deep, subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially with coarse punctures; visible abdominal sternites 2–4 each with row of large

punctures. **Head** (Fig. 6). Frons without longitudinal impressions; median area slightly raised. Female with small, median projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, rounded to slightly angulate. Eyes proportionally large; temples moderately long, about 0.6 times longitudinal diameter of eyes, parallel anteriorly, convergent posteriorly. **Thorax.** Pronotum (Fig. 6) usually elongate 1.1–1.3 times (most specimens seen 1.2 times or more) as long as wide, widest at level of posterior angles; sides divergent posteriorly; lateral indentations rather fine; anterior angle slightly protruding (usually less so than posterior angle), its extremity blunt; posterior angle distinct, marked by coarse protuberance; disc without impressions on anterior half. **Abdomen.** Male first visible abdominal sternite with oval, median depression; last visible abdominal sternite simple; female with apical margin of last visible sternite truncate and flanked by minute protuberances. **Male genitalia** (4 specimens dissected) (Fig. 16). Ventral lamina notched medially; dorsal lamina slightly truncate to rounded medially; tegmen with extremity rounded.

Length of body: 2.5–3.2 mm.

Distribution. This species occurs along the Atlantic Coast, from New Brunswick to Florida. We have seen specimens from the following states: Connecticut; Florida; Georgia; Maine; Maryland; Massachusetts; New Hampshire; New Jersey; New York; Virginia. One specimen seen from Reno Co., Kansas [FMNH] is likely mislabelled. In Canada, the species is known from one locality only: **New Brunswick:** Kouchibouguac Nat. Pk., 1.VI.1977, S.J. Miller (CNCI) 1♂, 1♀; idem, 2.VII.1977, J.R. Vockeroth (CNCI) 1♀.

Habitat. According to labels, this species has been collected in numbers by sifting wrack and looking under boards along beaches.

Monotoma myrmecophila Bousquet and Laplante, n.sp.

Etymology. From the Greek myrmec (ant) and phil (like), in reference to the fact that the species is found in ant nests.

Type Material. Holotype (♂) labelled: “Aweme, Man. 10.IX.28 R.M. White/ Holotype *Monotoma myrmecophila* Bousquet & Laplante CNC No. 22423”. The specimen is deposited in the Canadian National Collection of Insects.

Paratypes from the following localities. **Canada.** *Manitoba:* Aweme, 30.V.27, R.M. White (CNCI) 1♂; idem, 10.IX.28 (CNCI) 1♂, 1♀. *Alberta:* Calgary, 27.V.57, Carr (CNCI) 1♂, 3♀; idem IV.1957, BF & JL Carr (USNM) 1♂. **United States of America.** *Colorado:* Garland, 25.VI. (MCZ, USNM) 8♂, 9♀. *Iowa:* Iowa City, Wickham (USNM) 1♂, 2♀. *Michigan:* Detroit (USNM) 1♂. *Nebraska:* West Point (USNM) 5♂, 4♀. *North Dakota:* Hebron 7.X.1928 (USNM) 2♀.

Diagnosis. This species is easily recognized by the short and wide setae on the dorsum of the body.

Description. Colouration. Head mostly dark reddish brown to piceous, pronotum reddish brown to rufopiceous, elytra often slightly paler than pronotum, reddish brown. **Pubescence.** Setae on dorsum of body short, wide, wedge-shaped, more or less recumbent. **Punctuation.** Punctures slightly deeper than in other species treated. Frons and pronotum with large, subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially with large, subcontiguous punctures. **Head** (Fig. 7). Frons without longitudinal impressions; median area slightly raised. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes slightly less protruding than in *M. picipes*; temples moderately long, length 0.6–0.8 times that of longitudinal diameter of eyes, usually slightly divergent on basal half, then convergent. **Thorax.** Pronotum (Fig. 7) slightly elongate, 1.1–1.2 times as long as wide, widest at posterior angles; sides more or less parallel in anterior fourth,

widened and then slightly divergent in posterior half; lateral indentations rather coarse; anterior angle protruding, its extremity rounded; posterior angle more or less marked by large indentation, without protuberance; disc without foveae on anterior half. **Abdomen.** Male first visible abdominal sternite with slight, median, oval depression; last visible abdominal sternite simple. **Male genitalia** (3 specimens dissected) (Fig. 17). Ventral lamina deeply notched medially; dorsal lamina truncate medially; tegmen with extremity rounded.

Length of body: 2.0–2.7 mm.

Distribution. This species occurs from Michigan to Alberta, south to Colorado. It is known in Canada from two localities (see “Type Material” section).

Habitat. Apparently associated with ants. All ants collected with the specimens we saw belong to the genus *Formica* (*rufa* group).

Comments. Members of this species were identified in several collections as *M. fulvipes*. However, as mentioned previously (see section “Notes about Synonymy” of *M. picipes*), *M. fulvipes* is very likely a junior synonym of *M. picipes*.

This species belongs to the subgenus *Gyrocecis* Thomson, 1863 along with *M. angusticollis* Gyllenhal, 1827 and *M. conicicollis* Guérin-Méneville, 1829. These three species differ readily by their short, wedge-shaped setae on the dorsum of the body. All three species live in nests of *Formica* species.

Monotoma testacea Motschulsky, 1845

Monotoma testacea Motschulsky 1845: 97. Type locality: «bords du fleuve Irtych». Reitter (1901a: 196; 1901b: 6; 1911: 43); Kuhnt (1912: 507); Everts (1922: 253); Hansen (1950: 148, 149); Vogt (1967: 86); Peacock (1977: 13); Kuschel (1979: 45); Šlipiński (1981: 9); Hansen and Kristensen (1991: 44); Milander (1992: 71); Otero and Díaz-Pazos (1994: 101).

Monotoma quadraria Casey 1916: 90. Type locality: San Francisco, California [**new synonymy**].

Type Material Studied. Casey’s collection in the USNM has a single specimen under the name *M. quadraria*. It is labelled: “Cal/ Casey bequest 1925/ type USNM 49187/ quadraria Casey”. The label “Lectotype *Monotoma quadraria* Csy des. Y.Bousquet ’87” has been attached to it.

Notes about Synonymy. We have compared the external characters and the male genitalia of several specimens of *M. quadraria* with eight specimens of *M. testacea* from England (determined by Colin Johnson) and found no structural differences.

Diagnosis. This species can be recognized by its rather uniform reddish colouration, by the shape of the pronotum with its sides slightly sinuate or parallel, and by the presence, in most specimens, of two very shallow impressions on anterior half of the disc.

Description. Colouration. Body more or less uniformly reddish dorsally or elytra slightly paler than forebody, somewhat reddish yellow. **Pubescence.** Setae on dorsum of body elongate, slightly wider than in *M. picipes*. **Punctuation.** Frons and pronotum with large, deep, more or less subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially (on anterior half) with coarse punctures. **Head** (Fig. 8). Frons without longitudinal impressions; median area slightly raised, then slightly depressed before posterior margin. Female without protuberance on posterior margin dorsally. Lateral margin, between eye and antennal insertion, somewhat angulate. Eyes proportionally smaller than in *M. picipes*; temples moderately long, length 0.6–0.8 times that of longitudinal diameter of eyes, parallel to very slightly divergent posteriorly. **Thorax.** Pronotum (Fig. 8) slightly elongate, 1.1–1.2 times as long as wide; sides slightly sinuate or parallel; lateral indentations slightly finer than in *M. picipes*; anterior angle slightly protruding, its extremity rounded; posterior angle distinct, marked by protuberance; disc with 2 very shallow,

sometimes indistinct, impressions on anterior half. **Abdomen.** Male first visible abdominal sternite with slight, oval, median depression; last visible abdominal sternite simple. **Male genitalia** (4 specimens dissected) (Fig. 18). Ventral lamina notched medially; dorsal lamina truncate medially; tegmen with extremity rounded.

Length of body: 1.8–2.2 mm.

Distribution. This species has been recorded from various European countries, Caucasus, Turkestan, Siberia, and New Zealand. We have seen specimens from Arizona, California, Idaho, Illinois, Kansas, Maryland, Massachusetts, New Hampshire, New York, Oklahoma, Oregon, and Texas. In Canada, it is known from the following localities: **Quebec:** Montréal (MCZ) 1; idem, 8.V.19, J. Ouellet (ORUM) 1. La Trappe, 24.V.44, J. Ouellet (ORUM) 1. **Ontario.** Ottawa, Mer Bleue, 21.VI.73, Smetana & Davies (CNCI) 1; Ottawa-Kanata, 25.V.1979, A.& Z. Smetana (CNCI) 1. **Saskatchewan:** Truax (CNCI) 1. Thrasher, 1.XII.1953, D.B. Waddell (CNCI) 2. Radville, 1.VIII.1954, D.B. Waddell (CNCI) 4. Drinkwater, 26.XI.1953, D.B. Waddell (CNCI) 2. **Alberta:** New Dayton, 20.VII.1954, D.B. Waddell (CNCI) 1.

Habitat. Some specimens of this species were collected, as indicated by their label data, in mill feeds and oat bins. Peacock (1977) recorded it from decaying vegetable matter and in granaries.

Monotoma bicolor A. Villa and G.B. Villa, 1835

Monotoma bicolor A. Villa and G.B. Villa 1835: 49. Type locality not mentioned. Ganglbauer (1899: 573); Reitter (1911: 43); Kuhnt (1912: 507); Everts (1922: 253); Hansen (1950: 148, 149); Vogt (1967: 86); Peacock (1977: 13); Kuschel (1979: 45); Ślipiński (1981: 10); Hansen and Kristensen (1991: 44); Milander (1992: 71); Otero and Díaz-Pazos (1994: 101).

Monotoma parallellum LeConte 1855: 305. Type locality: "New York" [**new synonymy**].

Monotoma parallela: Horn (1879: 260); Blatchley (1910: 669); Hatch (1962: 252); Downie and Arnett (1996: 987).

Type Material Studied. LeConte's collection in the MCZ includes two specimens under the name *M. parallela*. The first specimen, a female, is labelled: "(Pink disc)/ Type 7041/ *M. parallellum* LeC. N.Y." and the second one, a male, "Mic". Since LeConte originally mentioned that he had only one specimen from New York, the first specimen is regarded as the holotype.

Notes about Synonymy. We have compared the external structures and the male genitalia of several specimens of *M. parallela* from North America with 14 specimens of *M. bicolor* from France (most of them identified by Colin Johnson). No structural differences were found and the two names are considered synonyms.

Diagnosis. We have found no particular character state that would differentiate this species from the other ones at first sight. It is best recognized by the character states listed in the key.

Description. Colouration. Head and pronotum reddish brown, rufopiceous, or piceous, elytra paler, usually yellowish to pale reddish brown. **Pubescence.** Setae on dorsum of body elongate, narrow. **Punctation.** Frons and pronotum with large, deep, more or less subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially (on anterior half) with rather coarse punctures. **Head** (Fig. 9). Frons without longitudinal impressions; median area slightly raised. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes proportionally large; temples moderately long, length 0.5–0.6 times that of longitudinal diameter of eyes, divergent posteriorly. Antennomere 2 subequal to antennomere 3. **Thorax.** Pronotum (Fig. 9) slightly elongate, 1.05–1.15 times as long as wide; sides slightly rounded, sometimes more or less parallel; lateral indentations often only slightly outlined; anterior angle protruding but often slightly so, its extremity rounded; posterior angle

distinct, marked by small protuberance; disc without impressions on anterior half. **Abdomen.** Male first visible abdominal sternite with slight, oval, median depression; last visible abdominal sternite simple. **Male genitalia** (7 specimens dissected) (Fig. 19). Ventral lamina deeply notched medially; dorsal lamina truncate medially; tegmen with extremity rounded.

Length of body: 1.9–2.5 mm.

Distribution. This species has been recorded from various countries in Europe, North Africa, Caucasus, Syria, Siberia, and New Zealand. We have seen specimens in the United States from Arkansas, Arizona, California, District of Columbia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maine, Massachusetts, Michigan, New Hampshire, New York, North Carolina, Ohio, Oklahoma, Oregon, Pennsylvania, Tennessee, Vermont, Wisconsin. In Canada, the species is known from the following localities: **New Brunswick.** Pointe-du-Chêne (MMUM) 1. **Québec.** Montréal, 3.VII. (MCZ) 1; idem, 19.V.19, 8.VI.21, 15.V.22, 20.VI.22, 23.VI.34, 20.IX., J. Ouellet (ORUM) 16; idem, 25.V.35, A. Robert (ORUM) 2; idem, 8.V.1971, 20.VI.1971, 19.V.1975, E.J. Kiteley (CNCI) 3. La Trappe, 12.VI.33, 6.V.44, 12.V.44, 26.V.45, 9.VI.45, 13.VI.45, 28.VI.45, 29.VI.45, 17.VII.45, 24.V.47, 30.VI.47, 28.V.48, 1.VI.48, J. Ouellet (ORUM) 17. Berthierville, 15.VI.38, J. Ouellet (ORUM) 1. Longueuil (CCCH) 1. **Ontario.** Ottawa-Kanata, 25.V.1979, A. & Z. Smetana (CNCI) 12. Prince Edward Co., 27.IV.55, Brimley (CNCI) 2. Vineland Station, 11.VII.37 (CNCI) 1. Tilbury, 26.V.1966 (FSCA) 1; idem, 27.VI.1966, V.1967, VIII.1967, X.1967, XI.1967, K. Stephan (FSCA) 8. **Saskatchewan.** Drinkwater, 26.XI.1953, D.B. Waddell (CNCI) 1. **British Columbia.** Vancouver, 15.IV.32, K. Graham (CNCI) 1. Salmon Arm, 4.V.32, H. Leech (CNCI) 1.

Habitat. Mainly in decaying vegetable matter (Peacock 1977). Some of the specimens studied were collected “under grass pile”, in “barnyard litter” and by “sifting - barn”.

Monotoma arida Casey, 1916

Monotoma arida Casey 1916: 89. Type locality: “probably Colorado”.

Monotoma avara Blatchley 1928: 65. Type locality: Royal Palm Park, Florida [new synonymy].

Type Material Studied. Casey’s collection in the USNM includes four specimens under the name *M. arida*. They are labelled as follows: specimen 1 “L/ Casey bequest 1925/ Type USNM 49186/ arida Csy.”; specimen 2 “L/ Casey bequest 1925/ arida-2/ Paratype USNM 49186”; specimen 3 as for specimen 2 except “arida-3”; specimen 4 as for specimen 2 except “arida-4”. The first three specimens belong to this species, the fourth one to *M. bicolor*. The first specimen is here designated as the lectotype and the label “Lectotype *Monotoma arida* Csy des. Y.Bousquet ’87” has been attached to it.

Blatchley (1928) described his *M. avara* from two males. One of them was designated as the lectotype by Blatchley (1930: 49). The specimen, housed in PURC, is labelled: “3587 [handwritten]/ TYPE/ Royal Palm Park, Fla. WSB 4-5-27 [date handwritten]/ *Monotoma avara* sp.nov. [handwritten]”.

Notes about Synonymy. We compared the external structures of the lectotype of *M. avara* with those of several specimens of *M. arida*. No differences were noted and the two names are listed in synonymy. The male of *M. arida* is quite distinctive by the presence of a large and deep depression on the last visible abdominal sternite. The lectotype of *M. avara* has the abdomen missing. However, Blatchley (1928: 65) originally mentioned in his description “last ventral of male with a very large, rounded median concavity”.

Diagnosis. Males of this species are distinguished by the presence of a deep, granulate depression on the last visible abdominal sternite. Females are similar to those of *M. americana* and *M. emarginata* but differ mainly in having the pronotum slightly elongate, not subquadrate.

Description. Colouration. Body dorsally more or less uniformly reddish brown to piceous, humeral calli paler. **Pubescence.** Setae on dorsum elongate, slightly wider than in *M. picipes*. **Punctuation.** Frons and pronotum with large, deep, subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially with coarse punctures. **Head** (Fig. 10). Frons without longitudinal impressions; median area slightly raised. Female without projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes proportionally slightly more protruding than in *M. picipes*; temples short, length about 0.3 times that of longitudinal diameter of eyes, slightly divergent posteriorly. **Thorax.** Pronotum (Fig. 10) slightly elongate, 1.10–1.15 times as long as wide, widest near level of posterior angles; sides slightly rounded; lateral indentations rather coarse; anterior angle slightly protruding, its extremity rounded; posterior angle distinct, marked by protuberance; disc without impressions on anterior half. **Abdomen.** Male first visible abdominal sternite with slight, oval, median depression; male last visible abdominal sternite with large, round, relatively deep, granulate depression; female with last visible sternite simple. **Male genitalia** (5 specimens dissected) (Fig. 20). Ventral lamina notched medially; dorsal lamina truncate medially; tegmen with extremity rounded.

Length of body: 1.8–2.2 mm.

Distribution. This species ranges over eastern North America from southern Ontario to Texas. The type locality, “probably Colorado”, is suspect since the state is outside the known range of the species. We have seen specimens from the following states: Alabama, Arkansas, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Missouri, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas. We know but a single specimen from Canada: **Ontario.** Rondeau Prov. Park, Harrison Trail, 30.V.1985, A. Smetana (CNCI) 1♂.

Habitat. Little is known about the habitat requirements of this species. Blatchley (1928: 66) collected two specimens “from beneath the dried remains of a mass of very foetid shrimp carrion”. The single Canadian specimen was taken by sifting fallen leaves and other debris in a deciduous forest with intermixed pines (A. Smetana, pers. comm.).

Monotoma americana Aubé, 1837

Monotoma americana Aubé 1837: 461. Type locality: “États-Unis d’Amérique”. Horn (1879: 260); Blatchley (1910: 668); Downie and Arnett (1996: 987).

Monotoma americanum: LeConte (1855: 305).

Monotoma corpulenta Motschulsky 1868: 200. Type locality: New Orleans, Louisiana [**new synonymy**].

Monotoma rhodeana Casey 1916: 91. Type locality: Boston Neck, Rhode Island [**new synonymy**]. Downie and Arnett (1996: 987).

Type Material Studied. Aubé’s collection in MHNP contains one female specimen under the name *M. americana*, labelled: “Caroline du Sud. [handwritten]/ Muséum Paris 1869 Coll. Ch. Aubé/ TYPE”. The specimen is the holotype, since Aubé originally mentioned he had a single specimen.

The Motschulsky collection contains two specimens under the name *M. corpulenta*. Both specimens are males, glued to the same plate. They are labelled: “[very small, square, orange label]/ [small, round, green label]/ *Monotoma corpulentum* Motsch Am. b. N.Orl [handwritten]/ *Lectotypus Monotoma corpulenta* Motsch [partly handwritten].” The posterior specimen has the genitalia extracted, and is here designated as the lectotype.

Casey’s collection includes one female specimen under the name *M. rhodeana* labelled “R.I./ Casey bequest 1925/ Type USNM 49189/ *rhodeana* Csy [handwritten]”. The specimen is here

designated as the lectotype and the label "Lectotype *Monotoma rhodeana* Csy. des. Y.Bousquet '88" has been attached to it.

Notes about Synonymy. The external structures and the male genitalia of the lectotype of *M. corpulenta* were compared with those of several specimens of *M. americana*. No important structural differences could be observed and the two names are considered synonyms.

The external structures of the lectotype of *M. rhodeana* and of several specimens of *M. americana* were compared. No differences were observed and both names are considered synonyms.

Diagnosis. We have observed no character state that would easily distinguish this species at first sight. It may be recognized by the character states given in the key.

Description. Colouration. Body dorsally more or less uniformly rufopiceous to piceous, humeral calli paler. **Pubescence.** Setae on dorsum elongate, narrow. **Punctuation.** Frons and pronotum with large, deep, subcontiguous punctures. Metasternum posteromedially and first visible abdominal sternite medially with coarse punctures. **Head** (Fig. 11). Frons without longitudinal impressions; median area slightly raised. Female with small, hornlike, median projection on posterior margin dorsally. Lateral margin, between eye and antennal insertion, angulate. Eyes proportionally slightly more protruding than in *M. picipes*; temples short, length about 0.3 times that of longitudinal diameter of eyes, usually slightly divergent posteriorly. **Thorax.** Pronotum (Fig. 11) convex, subquadrate, 1.00–1.07 times as long as wide, widest near level of posterior angles; sides straight to slightly rounded; lateral indentations rather coarse; anterior angle slightly protruding, its extremity rounded; posterior angle distinct, marked by protuberance; disc without impressions on anterior half. **Abdomen.** Male first visible abdominal sternite with slight, oval, median depression; male last sternite with more or less round, shallow (sometimes almost indistinct) depression; female with last visible sternite simple. **Male genitalia** (61 specimens dissected) (Fig. 21). Ventral lamina notched medially; dorsal lamina truncate medially; tegmen with extremity slightly emarginate.

Length of body: 1.9–2.4 mm.

Distribution. This species is widely distributed over the United States from coast to coast. We have seen it from three localities in Canada: **Québec.** La Trappe, 25.VI.44, 20.VI.47, J. Ouellet (ORUM) 2♀. **Ontario.** Rondeau Prov. Pk., Lakeshore Road, 30.V.1985, A. Smetana (CNCI) 23♂, 14♀; idem, 1–6.VI.1985, A. Davies & J.M. Campbell (CNCI) 3♂, 10♀. Tilbury, V.1967, K. Stephan (FSCA) 2♀.

Habitat. Mainly in decaying vegetable matter, such as compost, grass clippings, and hay litter. The numerous specimens from Rondeau Provincial Park were collected in "sifted grass pile & leaves".

Comments. We observed variation in the shape of the tegmen of the male genitalia. Some specimens, particularly from southern United States, have the tegmen more deeply emarginate medially, though not as much as that of *M. emarginata*. Considering the wide distribution of the taxon in the United States, it could represent a complex of species.

Monotoma emarginata Bousquet and Laplante, n.sp.

Etymology. From the Latin *emarginatus*, -a, -um (notched at the apex), in reference to the deeply notched tegmen.

Type Material. Holotype (♂) labelled: "Ont. Ottawa-Kanata 25.V.1979 A&Z Smetana/Holotype *Monotoma emarginata* Bousquet & Laplante CNC No. 22424". The specimen is deposited in the Canadian National Collection of Insects.

Paratypes from the following localities. **Canada. Ontario:** Ottawa-Kanata, 25.V.1979, A. & Z. Smetana (CNCI) 1♂, 2♀. **United States of America. Florida:** Tallahassee, Leon Co., 22.VI.1987, P. Skelley (FSCA) 1♂, 4♀. Ocala, Marion Co., 20.VII.1977, M.C. Thomas (FSCA) 1♂. Crescent City (USNM) 1♂. **Illinois:** Pine Hills Field Sta., Union Co., 15–22.V.1967, J.M. Campbell (CNCI) 1♂. **Indiana:** Indianapolis, 5.V.1965, C.E. White (FSCA) 1♂. **Kansas:** Lawrence, Douglas Co., 30.V.83, J. Pakaluk (USNM) 1♂. 2 mi. N Baldwin, Douglas Co., 16–24.V.1984, J. Pakaluk (USNM) 1♂. **Louisiana:** Baton Rouge, LSU Campus, 30.VI.1985, D.A. Rider (LSUC) 1♂, 1♀. **Missouri:** 1 mi. E Moberly, Randolph Co., 23.IV.73, E.G. Riley (TAMU) 1♂. 5 mi. NE Lawson, Ray Co., 4.VI.1972, E.G. Riley (TAMU) 1♂. **North Carolina:** Reidsville, Rockingham Co., 30.V.1973, J.S. Ashe (TAMU) 1♂, 1♀. **Oklahoma:** Latimer Co., various dates, K. Stephan (CNCI, FSCA) 9♂, 15♀. 5 mi. W Red Oak, Latimer Co., 9.IV.85, J. Pakaluk (USNM) 2♂; idem, XI.1978, X.1980, K. Stephan (FSCA) 2♀. **Texas:** Katy, II.1971, K. Stephan (FSCA) 1♀. **Wisconsin:** Kenosha, Kenosha Co., 12.XI.1962, W. Suter (FMNH) 1♂.

Diagnosis. This species is structurally very similar to *M. americana* but differs notably by the more deeply notched tegmen in the male and by the absence of a minute projection on the posterior margin of the head in the female.

Description. Same character states as *M. americana* except for the followings. **Head.** Posterior margin of female without projection medially. **Abdomen.** Last visible abdominal sternite of female with small longitudinal carina-like tubercle before apex in most specimens. **Male genitalia** (18 specimens dissected) (Fig. 22). Tegmen deeply notched at middle.

Distribution. This species lives in eastern North America from Ontario south to Florida and Texas. It is known in Canada from one locality (see “Type Material” section).

Habitat. The holotype and the paratypes from Ottawa-Kanata were taken by sifting a pile of moldy grass clippings (A. Smetana, pers. comm.). Numerous specimens from Latimer Co., Oklahoma, were collected from “oak tree hole”.

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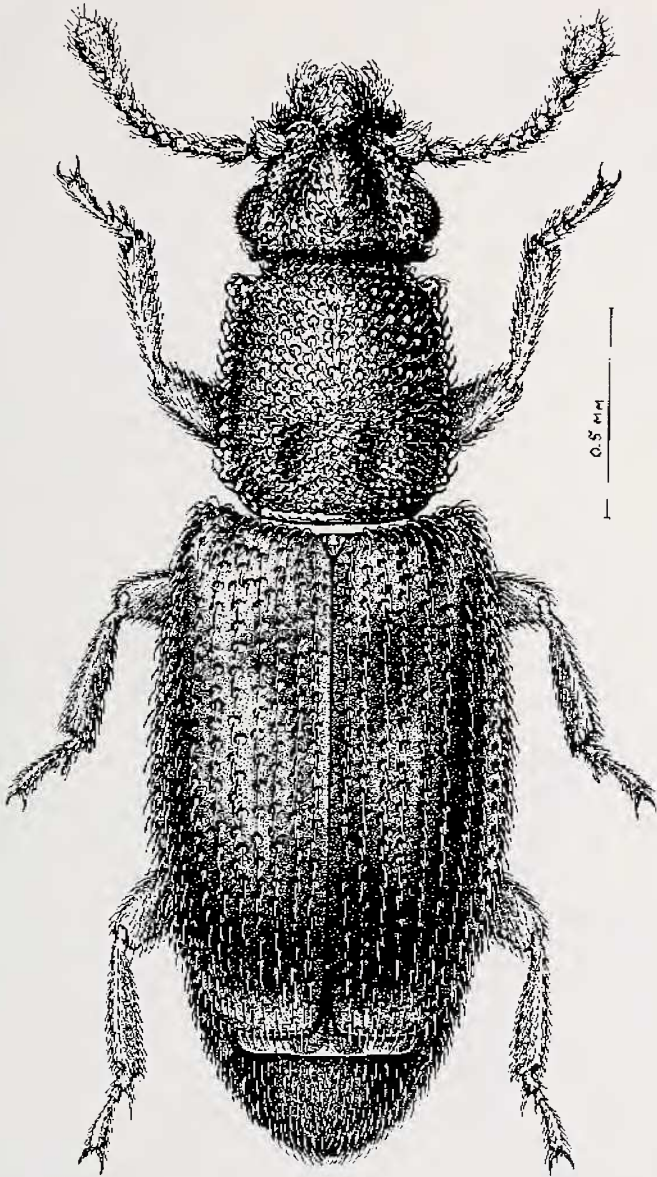
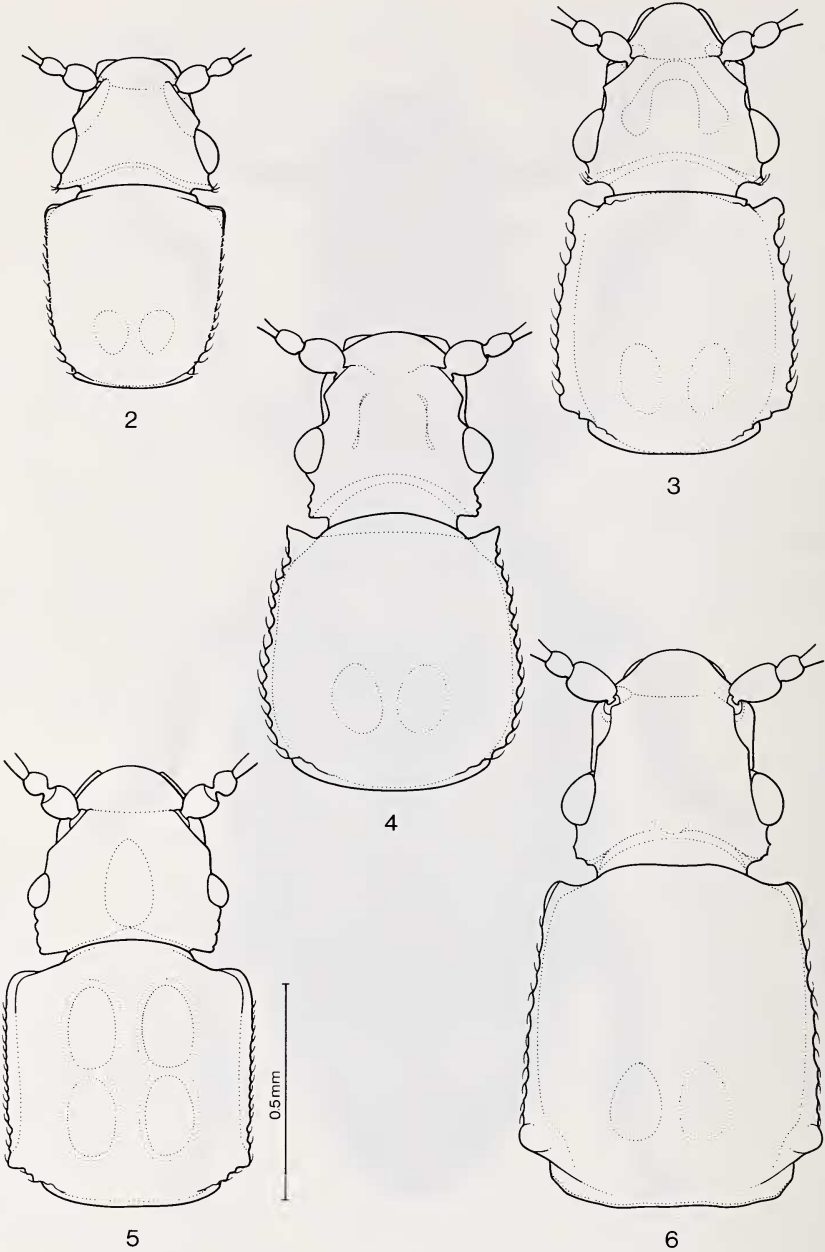
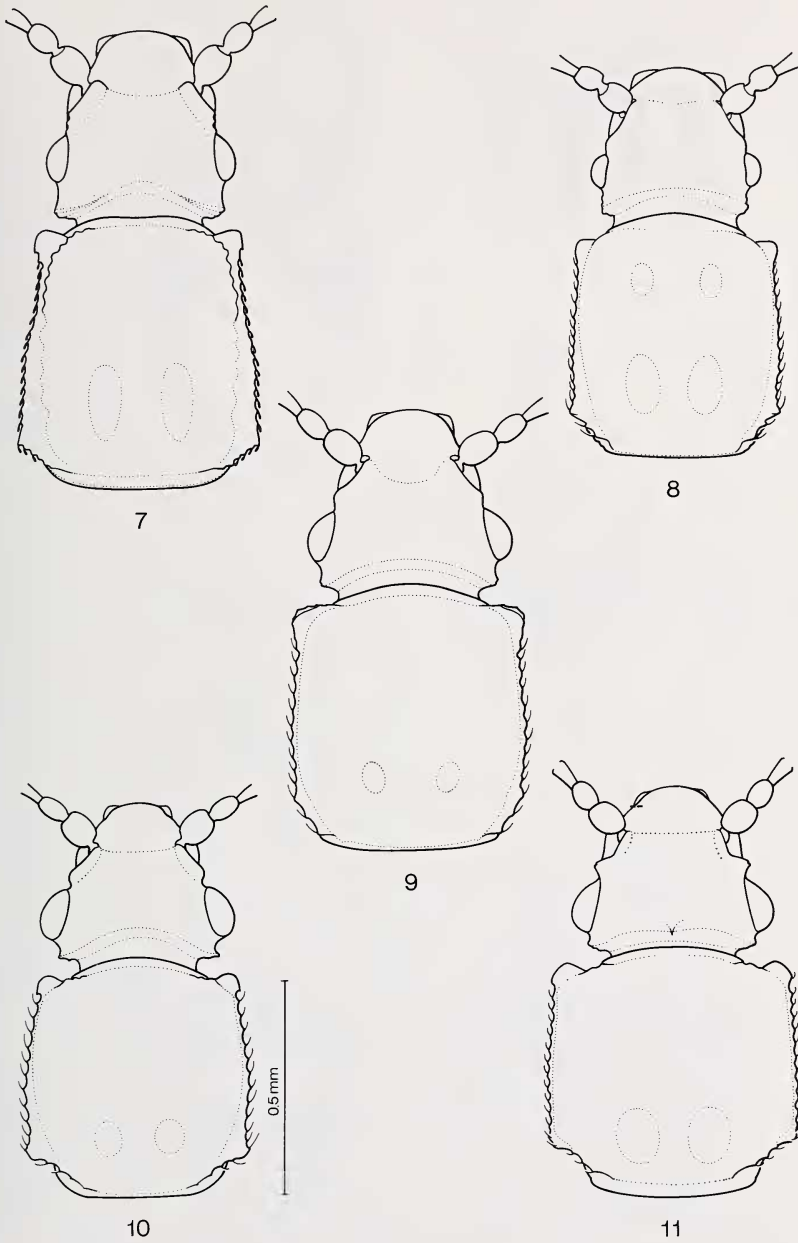


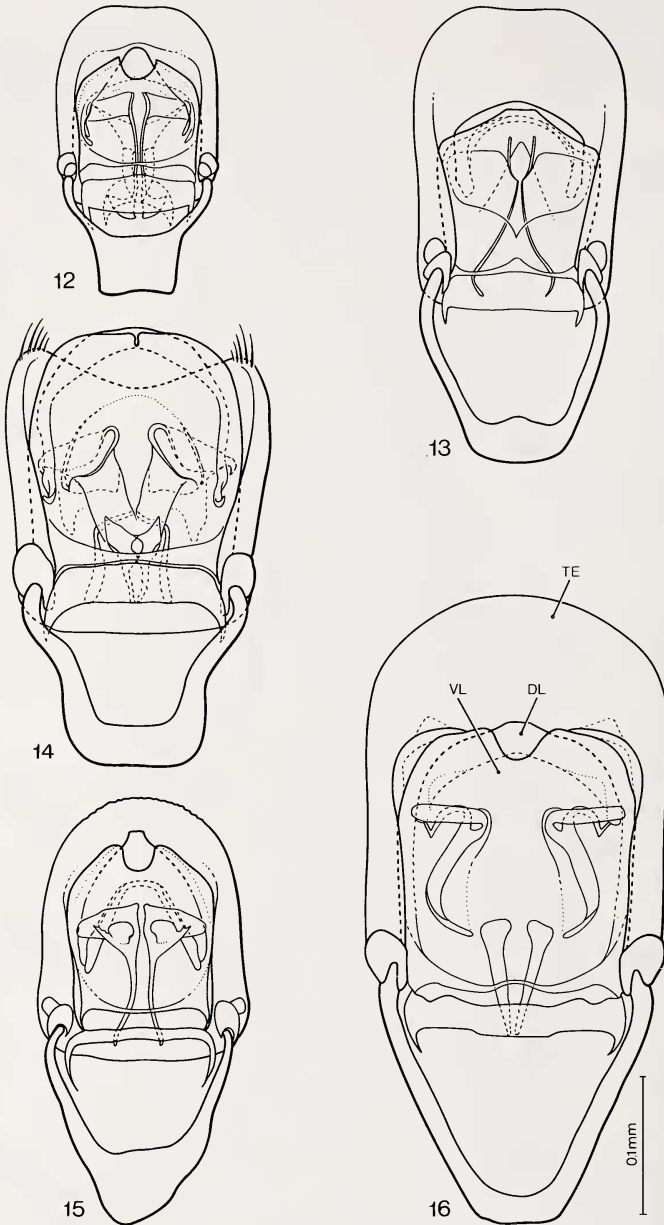
FIGURE 1. *Monotoma picipes* Herbst.



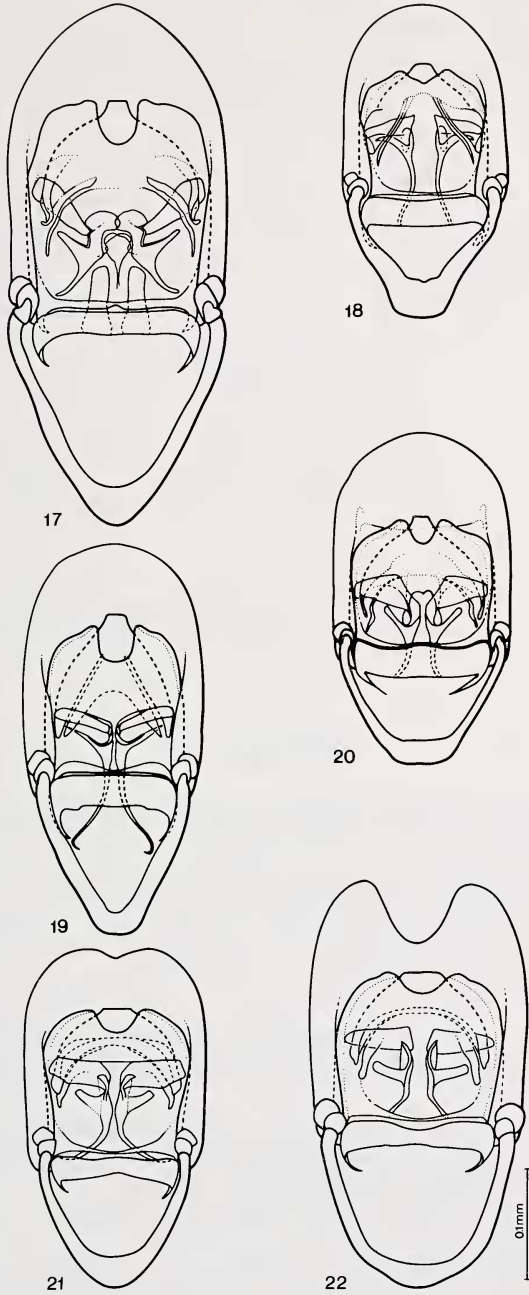
FIGURES 2–6. Head and pronotum. 2: *Monotoma longicollis*; 3: *M. picipes*; 4: *M. spinicollis*; 5: *M. quadrifoveolata*; 6: *M. producta*.



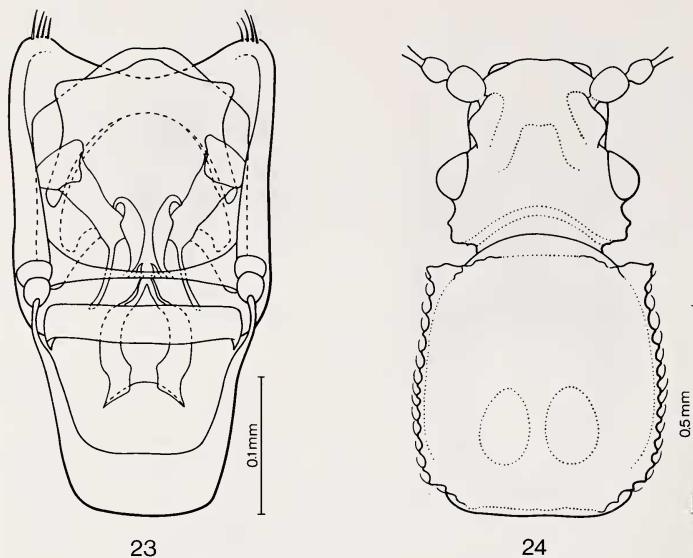
FIGURES 7–11. Head and pronotum. 7: *Monotoma myrmecophila*; 8: *M. testacea*; 9: *M. bicolor*; 10: *M. arida*; 11: *M. americana*.



FIGURES 12–16. Aedeagus (ventral view). 12: *Monotoma longicollis*; 13: *M. picipes*; 14: *M. spinicollis*; 15: *M. quadrifoveolata*; 16: *M. producta*. dl – dorsal lamina; te – tegmen; vl – ventral lamina.



FIGURES 17–22. Aedeagus (ventral view). 17: *Monotoma myrmecophila*; 18: *M. testacea*; 19: *M. bicolor*; 20: *M. arida*; 21: *M. americana*; 22: *M. emarginata*.



FIGURES 23–24. *Monotoma johnsoni*. 23: aedeagus (ventral view); 24: head and pronotum.

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